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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/925,850	08/09/2001	Sining Mao	12175-003001/ STL9812.00	3814

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EXAMINER

OMETZ, DAVID LOUIS

ART UNIT	PAPER NUMBER
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2653

DATE MAILED: 12/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/925,850

Applicant(s)

MAO ET AL.

Examiner

David L. Ometz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003 and 04 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 17-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 17-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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1. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged.
2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/10/03 has been entered.
3. Claim 4 is objected to because of the following informalities: in line 3, "SAR" should be changed to --SAF--. Appropriate correction is required.
4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Araki et al (US Pat 6483675). Araki et al shows a magnetic sensor in figure that is a tunneling magnetoresistive stack wherein the stack includes: a free layer 20 comprising a CoFe/Ru/CoFe SAF (see col. 4, lines 33-41, inherently anti-parallel magnetizations due to the "antiferromagnetic coupling" tri-layer design); a barrier layer 30 on the free layer 20; a single pinned layer 40 on the barrier layer 30 wherein the pinned layer is a synthetic antiferromagnet (again, see col. 4, lines 33-41); and a bias layer 50.
6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14, 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dill et al (US Pat 6023395) in view of Araki et al (US Pat 6483675). Dill et al shows a magnetic sensor in figure 4A (used in a hard disk drive (fig. 1) for a computer) that is a tunneling magnetoresistive stack wherein the stack includes: a free layer 132; a barrier layer 120 on the free layer 132; a pinned layer 118 on the barrier layer 120 wherein the pinned layer is a synthetic antiferromagnet (see col. 9, lines 65 *et seq.*); a bias layer 150 on the free layer 132 opposite the barrier layer 120 wherein the bias layer is composed of an antiferromagnetic layer (NiMn) placed on a ferromagnetic layer and a second spacer layer, the ferromagnetic layer and second spacer layer being between the bias layer 150 and the free layer 132 (see col. 13, lines 8-45); pinning layer 116 for pinning the pinned layer 118. However, Dill et al does not show the free layer 132 being a SAF composed of two CoFe films separated by an Ru spacer layer. Araki et al shows a tunneling magnetoresistive stack in figure 1 that has a free layer 20 made of a SAF consisting of first and second CoFe ferromagnetic layers with antiparallel magnetizations (inherent in the antiferromagnetic coupling) and different thicknesses (30 Angstroms and 20 Angstroms) wherein an Ru spacer separates the two ferromagnetic layers (see col. 4, lines 33-41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the single free layer 132 of Dill et al with the SAF free layer taught by Araki et al as doing this would decrease the stray effects of the magnetization from the free layer on the remaining layers of the head due to the anti-parallel arrangement of the SAF free layer. The anti-

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parallel arrangement of the SAF free layer provides "flux closure", thereby enhancing magnetic stability of the head.

7. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection to Araki et al.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Pat 6538859 discloses a tunnel junction head with a SAF free layer (see col. 8).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Ometz whose telephone number is (703) 308-1296.

The examiner can normally be reached on M-W, 6:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (703) 305-6137. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.



David L. Ometz  
Primary Examiner  
Art Unit 2653

DLO  
December 10, 2003